A second conclusion may, therefore, be drawn from these observations, namely, *that in the normal individual descent of the heart with inspiratory movement of the diaphragm may so press the aortic arch upon the left bronchus as to impart to the trachea the aortic pulse, recognizable at the larynx as a palpable tug of greater or less distinctness.*

THE NUMBER OF CASES MANIFESTING VARIOUS DEGREES OF TRACHEAL TUG.

	Age in years.	Males, 245.						Females, 185.					
		None	Slight	d	d′	d″	d‴	None	Slight	d	d′	d″	d‴
I. Normal persons and those without signs or history of pulmonary disease.	0 to 10	3	...	...	...	...	...	2					
	11 " 20	5	1	6	1	1	1	15	4	...	...	...	1
	21 " 30	10	6	12	6	3	...	51	8	4			
	31 " 50	29	6	5	...	...	...	22	7	3	1	1	
	51 " 70	13	2	2	...	...	...	7	1				
	Over 70	1	...	...	...	...	...	2					
II Persons with signs or history of tuberculous, pleuritic or pneumonic affection of the left lung.	0 to 10												
	11 " 20	...	...	1	...	...	...	2	1	1			
	21 " 30	7	8	16	9	2	6	6	7	4	1	...	1
	31 " 50	10	13	10	16	4	5	4	5	5	2	1	2
	51 " 70	...	2	...	1	1	...	...	1	1	2		
	Over 70	...	1	...	...	...	...	1					
III. Persons manifesting marked emphysema or arterio-sclerosis.	0 to 10	1											
	11 " 20	...	...										
	21 " 30	...	...	1	1	...	...	1	...	1			
	31 " 50	3	2	...	...	...	...	1		...			
	51 " 70	5	1	1	1	...	...	3	...	1			
	Over 70	1	1	...	...	...	...	...	...	2			

PRIMARY SARCOMA OF THE THYROID GLAND.

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THE history of abnormal conditions of the thyroid gland begins several centuries ago. Although traces of näive knowledge of enlargements of the thyroid body, and indeed of true sarcoma of this organ, also date back many years, a close study of the literature bearing on thyroid tumors has brought to light astonishingly few cases of sarcoma, especially of primary sarcoma. From the earliest publication of Alibert, in 1817, the subject passes unnoticed save the three cases reported by Raynaud, Forster, and Virchow, until 1879, when our knowledge of the subject was very materially advanced by Kaufmann. The basis of this observer's study was seven collected cases, three of which he had observed and examined himself.

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[1] Read before the New York Pathological Society, May 8, 1901.

The later literature has been enriched by other cases reported from time to time mainly by Continental writers. Thus Morf, after a critical search through the literature in 1899, was able to collect, including his own case, only forty examples of this uncommon disease. To this number I have been able to add fifteen others not included in Morf's paper, thus making a total of fifty-five recorded cases. It is only fair to point out, however, that these figures indicate too great an infrequency. Later statistical investigations will undoubtedly show that primary sarcoma of the thyroid gland is much less uncommon.

According to Mueller,[1] secondary sarcoma is also uncommon. Thus of 102 cases of primary sarcoma elsewhere, metastatic invasion of the thyroid and pancreas was noted in only 3.1 per cent. of the cases.

A consideration of the relative frequency of primary carcinoma of the thyroid, especially as compared with that of sarcoma, is not without interest in this connection. Kaufmann, in 1879, had collected twenty-three cases of primary carcinoma, twelve of which had been studied by himself. Rose, in the same year, published a dozen new cases, and Poncet, in 1899, succeeded in collecting fifty other cases, mostly from the comparatively recent literature. The frequency varies, like that of sarcoma, in different sections of country. Thus, Lücke states that he personally observed ten cases in two years in Berne, and states that in goitrous districts malignant disease of the thyroid occurs with greater frequency than elsewhere.

Limacher, of Berne, in 7641 autopsies found carcinoma of the thyroid 38 times, while Chiari, of Prague, found the lesion only 11 times in 7700 post-mortems. Winniwater collected from the post-mortem records of several German universities 548 cases of carcinoma of the thyroid. Of these, 0.73 were primary in the gland. Among 7294 cases of carcinoma collected from British hospitals, in only seven instances was the thyroid the primary seat of the tumor. The relative frequency is about 3 or 4 to 1 of sarcoma.[2]

The case the subject of this paper was clinically observed in the service of Prof. Weir at the Roosevelt Hospital, and later came into my hands for autopsy. The salient points bearing on the clinical and anatomical features alone shall be given.[3] The following are some of the main features excerpted from the history protocol:

J. M., a married woman, aged forty-five years, born in Scotland, was admitted into the hospital January 3, 1901, complaining of a small mass in the neck. The family history is negative as regards tumors, syphilis, or tuberculosis. Ten weeks before present admission into the hospital the patient had been sick with pneumonia; otherwise she had always considered herself a strong and healthy woman. About eight years ago the patient noticed a lump in the middle of her neck at its lower part. It grew very slowly until it reached the size of a small hen's egg. This maximum was attained in about one year. At no time did it interfere either with breathing or swallowing. The patient considered herself quite well until ten days ago, when there appeared within two days a small lump on the right side of the neck just above the middle of the clavicle. Since reaching maximum size on the second day the swelling has remained the same size. On pressure the parts were quite tender. With the appearance of this swelling there developed dyspnœa and dysphagia, which have become more and more severe. There had been no loss of flesh or strength; appetite remained good.

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[1] Cited by Lücke u. Zahn. Chirurg. der Gesch., 1 Theil. Deutsch Chirurgie.

[2] For consideration of primary carcinoma of the thyroid, with bibliography, consult A. E. Halstead, "Carcinoma of the Thyroid Gland," Medicine, Detroit, February, 1901, p. 107.

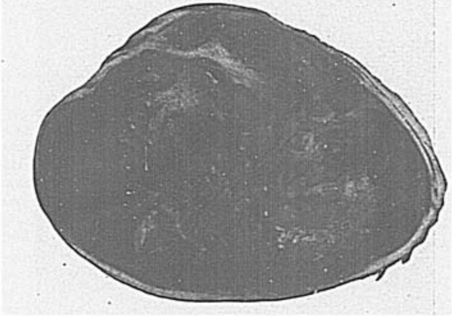
[3] The author is indebted to Dr. George Emerson Brewer, of New York City, for the clinical side of the case.

Physical Examination. Patient is a well-nourished woman, whose breathing is labored and stridulous in character, and there is some loss of voice without hoarseness. In the median line of the neck in the region of the thyroid there is a distinct tumor mass. It extends to the left of the median line one and one-half inches, and tracheal rings can be felt beyond the left border of the growth, which is about the size of an orange. The growth is firm and elastic to the feel. Its outline could be fairly well made out, and it appears smooth and rounded. It is not painful on pressure. The overlying skin is freely movable; with deglutition the mass moves up and down, otherwise it appears more or less fixed to the deeper structures. The smaller mass, to which the patient particularly drew attention, is situated on the right side of the neck one inch above the clavicle near its middle. It is about the size of a walnut, somewhat firm, and very tender. The overlying skin is discolored blue. No enlarged lymph nodes are detected anywhere. The temperature on admission was 99.2°, and the urine contained a trace of albumin, but no casts were observed; the specific gravity was 1018. The operation for removal was performed by Dr. Brewer on the day following admission. Without mentioning the technical details of the surgical procedure, it may be said that the walnut-sized swelling just above the right clavicle was shown to be a hæmatoma located beneath the platysma muscle. The main tumor in the mid-neck was found to be encapsulated and not adherent to the anterior structures. The tumor was smooth, apparently cystic in character, and had replaced the right lobe of the thyroid. The isthmus and left lobe looked normal, and were not removed. Considerable trouble was experienced by the operator from the free hemorrhage which occurred in the incised tissues. No enlarged lymph nodes were observed during the operation. For about one week the patient's condition remained satisfactory, but after that it became increasingly worse from the dyspnœa, which became more and more severe owing to the actively recurrent growth which pressed more and more upon the trachea. Further, the amount of urine passed ranged only from eight to twelve ounces daily. On the sixteenth day after operation moderate ptosis of the right eye was observed. Two days later the right pupil was contracted, the left remaining normal. Toward evening general convulsions developed, and the patient died in full consciousness a little later, apparently from asphyxia.

The temperature, which had been 99.2° on admission, never reached normal, but fluctuated irregularly, with an evening rise of 1° to 2° until death.

Description of Tumor Removed at Operation. This has the size and contour of a goose-egg (7 x 5 x 4 cm.). (Fig. 1.) It is uniformly firm in consistence. The whole mass, which consists of the entire right lobe of the thyroid, is sharply encapsulated by a firm fibrous capsule from 1 to 2 mm. in thickness. Attached to the exterior of the latter are several torn fibrous adhesions. On section the cut surface is for the most part smooth, having a dark-red color in some places, but for the greater portion showing irregular but sharply defined tissue of a yellowish or grayish color, extending from the interior of the encapsulating fibrous tissue in the form of strands, or in less definite forms, as though the tumor-infiltration occurred along the connective tissue framework of the organ. Intermingled with this tissue, which is the tumor proper, is a considerable quantity of fresh and partly clotted blood. At one extremity of the specimen is a cavity about the size of a marble (2 cm.), which also contains clotted blood. (Fig. 2.)

FIG. 1.

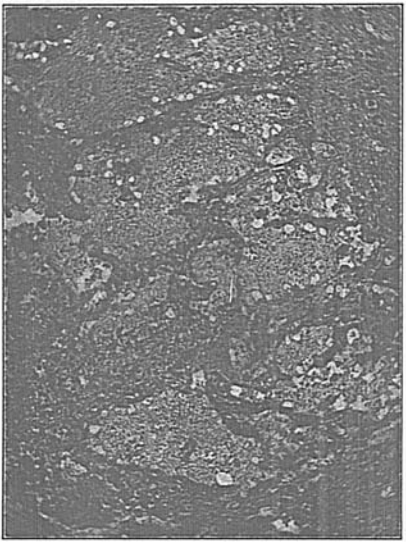


Histological Study of the Tumor. Practically the whole of the normal thyroid tissue has been replaced by tumor growth. The fibrous tissue capsule of the specimen for the most part is made up of dense fibrous tissue, but on one side (left) small portions may be seen in which new growth, similar to that of the main tumor, has occurred. At only one portion was invasion throughout the entire thickness of the capsule noted.

The portions of thyroidal tissue which remained uninvolved by new growth showed changes, partly the result of compression. The alveoli of the gland are irregularly distorted into various shapes from large oval or round spaces into mere slits in the tissue, containing some colloid finely granular material and extravasated red corpuscles. The epithelium, although sometimes normal in appearance, is largely compressed or else has completely disappeared. The fibrous tissue framework of the thyroid adjoining the definitely involved portions shows an abundant round, oval, and spindle-cell infiltration indicating the probable mode of extension of the growth along this portion of the organ.

For the most part the tumor consists of extremely cellular tissue containing numerous larger and smaller blood channels filled with blood. The latter are more or less regularly distributed through the cellular tissue, usually separated from it by a sharply defined layer of endothelium. Occasionally, however, they appear to be mere blood spaces lying between the cells of the tumor without any intervening endothelial wall. Here and there within the bloodvessels may be seen large masses of closely-packed cells, often almost occluding the vessel lumen. They are similar to those making up the main tissue of the specimen.

FIG. 2.



The cellular portion proper of the tumor is made up of closely-packed larger and smaller cells whose nuclei take the nuclear dyes strongly. In morphology they conform to the spindle and small and large round-cell variety, with scanty cytoplasm. The spindle-cells predominate. Beside the former cell types a moderate number of cells of intermediate forms are likewise distributed among the main cell types. Occasional mitotic figures are made out showing evidences of both regular and irregular division of the nucleus. The intercellular connective tissue reticulum is observed only in places and is small in amount. Throughout the tissue between the cells may be seen red blood-corpuscles, extremely abundant in some portions of the tissue.

Histological Diagnosis. Angiosarcoma (mixed cells) of the thyroid. The autopsy was made twenty-three hours after death. The brain was not examined, a partial autopsy only having been permitted.

Anatomical Diagnosis. Primary sarcoma of the thyroid body, with well-marked reduction of the tracheal and œsophageal lumina by the pressure of the new growth; fatty degeneration of the heart; chronic diffuse nephritis; fatty liver; intramural nodular fibromyoma of the body of uterus; fibroadenoma of left breast; œdema and congestion of both lungs.

The incision wound in the neck was filled with granulation tissue and clotted blood. The remaining left lobe of the thyroid and isthmus were converted into a tumor mass irregularly oval in form. The whole mass measured 10 x 6 x 4 cm. It was sharply differentiated from the normal structures of the parts and limited above by the cricoid cartilage and extending downward to just above the clavicle. It reached outward to the right as far as the anterior border of the trapezius muscle; across to the left a little beyond the middle line of the neck, forcing the trachea over to the right side. The trachea was compressed from the front and the left toward the right and backward. The lumen was not completely occluded at any point, but was much narrowed. Thus, at the third ring it measured only 4 mm. in diameter. The œsophagus at a corresponding place was also compressed from the front and the left. The large bloodvessels of the neck were normal in appearance, although displaced well to the left side. On section the cut surface of the new growth presented a dark-red appearance, mottled with small, irregularly sized areas of yellow and gray. There was no distinct evidence of encapsulation. Beyond recurrence at local seat, no metastases were found anywhere in the body, although these were searched for with great care, especially in the neighboring tissues, lungs, and bone-marrow.

The microscopical findings of the viscera confirmed the gross anatomical diagnosis. The histological features of the remaining left lobe and isthmus, which were found involved by new growth, were essentially the same as those already described in connection with the tissue removed at operation.

The bacteriological examination revealed the presence of the colon bacillus throughout the body. No clinical significance was attached to its presence, since it was regarded as the result of post-mortem invasion.

To summarize, then, this case is one of angiosarcoma developing in a goitre and pressing upon the trachea, causing death by asphyxiation. No metastatic growths were found anywhere beyond the local seat of the primary lesion.

The close relationship of goitre to the development of sarcoma of the thyroid gland is of the greatest interest, both from the clinical and pathological view-points. Its common association with goitre and frequent occurrence in goitre countries have been known for many years, and recent observations have brought this forward more conspicuously than ever before. A. Morf very rightly remarks: "If we remember how easily a small enlargement of the thyroid is overlooked in a locality where from one-half to one-third of the inhabitants are afflicted with the disease (Bircher), and also remember that in many of the histories of cases reported no definite statement is made in regard to previous goitre, it is probable that the proportion of cases in which a benign enlargement precedes the malignant growth is larger than appears from the figures."

An analysis of a series of 51 cases of primary sarcoma of the thyroid shows that in 35 previous goitre existed, and in only 16 was it absent. The incidence of thyroid sarcoma at different age periods is not without some interest. Of eight cases which developed between the ages of twenty to forty, one-half only showed previous goitre, while in a series of thirty-two others in which the sarcoma developed between the ages of forty to sixty so many as 27, or 84 per cent., had had goitre before the development of the sarcoma. This, then, indicates clearly enough that with the increase in age of these cases previous goitre becomes more frequent. With regard to its occurrence in the two sexes it may be said that goitre seems to be more frequent in women; thus, it was present in 59 per cent. of the men and in 79 per cent. of the women.

ANALYSIS OF 51 CASES WITH REFERENCE TO PREVIOUS GOITRE.

Age period.	Number.	Previous goitre.		No previous goitre.	
		Male.	Females.	Male.	Females.
10 to 20 years	1	1	0	0	0
20 " 30 "	3	1	1	1	0
30 " 40 "	5	1	1	3	0
40 " 50 "	14	5	8	1	0
50 " 60 "	18	6	8	2	2
60 " 70 "	10	2	1	4	3
Total	51	16	19	11	5

That sarcoma of the thyroid occurs more frequently in advanced than in early life is a point on which all observers agree. The large majority of them occur after the fortieth year, with comparatively the largest number during the fifth decade.

For the entire fifty-three cases collected in the literature, the greatest number occurred between the years forty to seventy. To this age-period forty-five of the cases belong, while only ten of the fifty-five developed in persons under forty years of age. The earliest age at which primary sarcoma of the thyroid was noted was in a boy, aged eleven years. For reasons which are not very apparent the greatest number of cases occurs between forty and sixty. Morf suggests that this unusual age-prevalence of thyroid sarcoma is perhaps explicable in the light of observations made by Wolfer, who found that the parenchymatous elements of the thyroid become atrophic in later life, this atrophy often being accompanied by copious hyperplasia of the interacinous connective tissue. For my own part this seems insufficient to explain the facts. The influence of sex upon the development of primary sarcoma of the thyroid is probably unimportant. Among the series of fifty-five cases twenty-eight were men and twenty-seven women. The family history evidently plays little part as a predisposing factor. The disease is said to have followed injury to the thyroid in one or two cases. Pick and Forster were disposed to lay greater stress upon this than more recent writers have done. At all events such a factor is rare.

The relation of the origin of the tumor to the anatomical distribution is variable, but in the majority of cases, whether in men or women, the sarcoma originates in the right lobe of the thyroid gland. In forty-six cases in which this lobe distribution is noted, thirty-one, or 86 per cent., originated in the right lobe, and only fifteen, or 32 per cent., in the left lobe. The origin according to sex is as follows:

Sex.	Right lobe.	Left lobe.
Males (25)	19 — 76 per cent.	6 — 24 per cent.
Females (21)	12 — 57 per cent.	9 — 43 per cent.

From this table it may be clearly seen that the relative frequency of right and left lobe origin of the tumor is somewhat different in the two sexes. Thus in man the right lobe was involved in 76 per cent. of the men and in 57 per cent. of the women, showing a comparatively much higher right lobe distribution in men.

Sarcomata of the thyroid ordinarily grow quite rapidly. The duration of the disease varies from several weeks to over one year. Lücke states that the course of the disease is usually less than one year; perhaps eight months represent the average. Death is often induced by involvement of the trachea or œsophagus, or both.

The mortality shortly after operation for removal of the growth has been remarkably high. This is likewise true for extirpation of carcinoma of the thyroid gland.

The physical characters of sarcomatous tumors of the thyroid are quite variable. The size may not exceed that of a small nodule one or two centimetres in diameter. On the other hand, the mass may be of sufficient size to cover the entire anterior surface of the neck. Ordinarily these tumors consist of more or less regular, firm, nodular masses with smooth surfaces. In a large number of instances, especially in the early period of its development, the tumor growth is apt to be confined within the capsule of the thyroid gland. With fuller and more extensive growth invasion of the capsule and neighboring tissues is common.

When the tumor attains a considerable size the anatomical relations of the tissues of this part of the body become considerably changed.

Anatomical structures may be compressed or displaced, or from newly-formed adhesions to the tumor the walls of bloodvessels may become invaded by new growth or destroyed. Thrombosis of the veins has been observed, followed by greater or less circulatory and respiratory changes, and often by œdema of the neck or even the upper half of the body. The skin overlying the tumor may appear normal, or may be invaded by the neoplasm. Implication of the trachea, larynx, and œsophagus has been noted in a very large proportion of the reported cases. Involvement by compression or extension of the neoplasm to one or the other of these structures occurs in 50 per cent. or more of the cases. This is sufficiently explicable for obvious anatomical reasons. The nerves, especially the vagus and sympathetic, are sometimes involved in the process. From complications of this sort disturbances in the vocal cords, ptosis, pupil inequalities, exophthalmos, unilateral facial thermic perturbations, paralysis of the arm, etc., have followed and been observed in different cases.

Metastasis is common in primary sarcoma of the thyroid. Most writers agree that cervical lymph node, lung, and bone involvement with secondary growth are frequent. In a very large proportion of the cases the former are alone invaded. Next in frequency in the order named come the lungs and bone. The same high proportion of lung and bone metastasis is also true for carcinoma of the thyroid. Dissemination of the growth occurs both through circulatory and lymphatic channels. The numerous cell emboli (sarcoma?) observed in the blood channels and vessels of the case which I have reported in this paper illustrate the former mode of extension quite well, although no secondary growths were observed anywhere beyond the seat of occurrence of the primary tumor. But both Kaufmann and Wolfer have reported cases in which extensive tumor thrombi were found in the large veins.

It has been generally assumed that these rapidly growing sarcomata perforate the connective tissue capsule of the thyroid gland, and thus by extension by contiguity large tumor masses are formed. Braun, on the other hand, believes that these large tumors are formed as often, if not oftener, by coalescence with neighboring tumors which may have originated from secondary foci, such as the cervical lymph nodes, for instance. Within the thyroid tissue itself, as Kaufmann and others pointed out, extension ordinarily occurs along the interacinous connective tissue. From this, pressure and other changes subsequently take place.

The microscopical features of primary sarcomata of the thyroid have been studied by different observers. The greatest diversity in the type of these tumors has been described; but, on the whole, the majority conform in their general morphological characters to either the round or spindle-celled varieties, or a mixture of both. Angiosarcomata and tumors with bony formations have likewise been reported.

CONCLUSIONS. 1. Primary sarcoma of the thyroid gland is rare, but probably of more common occurrence than statistics show. It is less frequent than primary carcinoma of the thyroid gland.

2. It is commonly associated with goitre. Those cases developing in persons between forty and sixty years of age show a higher percentage of previous goitre than younger individuals. Goitre associated with sarcoma of the thyroid is more common in women than in men.

3. Sarcoma of the thyroid occurs oftener in late than in early life. The greatest age frequency is between forty and sixty.

4. Sex is probably an unimportant element in its development.

5. The primary tumor most frequently originates in the right lobe of the thyroid body. This distribution seems to be more frequent in men than in women.

6. The clinical course of the disease is usually relatively acute.

7. Involvement by pressure or new growth of the trachea or larynx is common.

8. Metastasis occurs through blood or lymph channels, or both.

9. Round and spindle or mixed-celled sarcomata are most common. Angiosarcomata are not rare.

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SPLENIC-MYELOGENOUS LEUKÆMIA, WITH PULMONARY, LARYNGEAL, AND FAUCIAL TUBERCULOSIS.[1]

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of New York.

Chronic leukæmic conditions, when complicated by intercurrent infections, present reactive cytogenetic phenomena.

The influence of the added infection manifests itself by causing a gradual disappearance of the hæmatological characteristics of the leukæmia.

Observations on this point thus far recorded are limited in scope, embracing principally the influence of *acute* infections, especially those of a septic nature; *chronic* infections associated with true leukæmia barely find mention.

In a recent communication on "Splenic-myelogenous Leukæmia with Pulmonary Tuberculosis," by Elsner and Groat,[2] it is stated that "splenic-myelogenous leukæmia combined with tuberculosis is of such rare occurrence that there is practically no literature on the subject at the present time. The rarity of these complications is made positive by the fact, elicited through private correspondence, that clinicians and pathologists of such wide experience as Stengel, Osler, Cabot, Prudden, and Janeway have never seen a case."

The patient which it is my privilege to present here embodies this unusual association of pathological conditions as manifested by clinical and microscopical findings.

The history of the case is briefly as follows:

Mrs. Annie O. N., aged thirty-five years. Married four years. One pregnancy, the child living and healthy; is now two years old. No miscarriages. The patient complains of aphonia, pain on swallowing, cough, night-sweats, and amenorrhœa of three months' standing.

Family History. The father of the patient died as the result of an accident. The mother, one brother and two sisters, one of whom is reported as having recovered from pulmonary tuberculosis, are living and well. One sister died of tuberculosis at thirty-one. The patient was born in Brooklyn. From her second to her tenth year she lived in the northern part of Ireland, after which she returned to Brooklyn, residing there to the present time. Her environment and habits were always good. She remembers only to have had mild scarlatina, whooping-cough, and measles during childhood. Splenic enlargement was first noticed incidentally during her normal puerperal convalescence two years ago. As it caused no inconvenience it was ignored.

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[1] Presented (with demonstration of patient and blood) to the Section on Internal Medicine of the New York Academy of Medicine, May 21, 1901.

[2] American Journal of the Medical Sciences, March, 1901.

Her present illness began on New Year's day, when, without premonitory symptoms or apparent cause, she awoke suffering from throat pain, cough, and hoarseness. A physician, after several weeks of unsuccessful treatment, sent her to Lakewood, where she remained five weeks without apparent benefit. From that time to the present the local conditions became more aggravated, while her general condition deteriorated, the patient losing twelve pounds in weight.

FIG. 1.

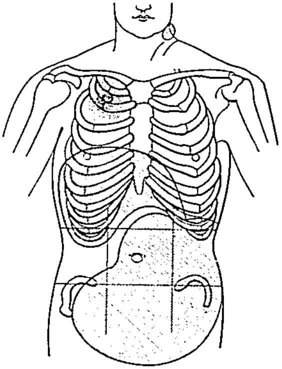
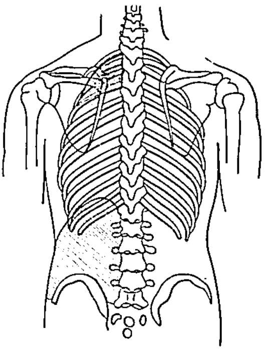


FIG. 2.



Examination on April 17, 1901. A small woman, of slender frame and phthisical habitus. Height, five feet; weight, 112 pounds. No appreciable panniculus. The skin is pale with a grayish-yellow tinge. No icterus. In the flexures of the elbows, groins, and knees are seen red, infiltrated, scaly eczematous patches. The fingers present clubbed extremities. The left submaxillary region contains a packet of enlarged lymphatic glands about the size of a walnut. There are no other lymphatic swellings visible or palpable. Pressure over the sternum and long bones elicits no pain. The abdomen is markedly prominent. There are no visible dilated veins. Temperature 99.5°, pulse 120, respiration 35. Tongue coated. Inspection of the pharynx shows the uvula and left half of the faucial arch, including pillars and tonsils, diffusely red and infiltrated. The junction of the left uvular border and soft palate is deeply fissured. This whole involved area presents a number of discrete, small, round, superficial ulcers, covered by a grayish-yellow coating. The tonsillar crypts are filled with yellow semi-solid plugs.